CSC 423 Project - Part 2
Due Nov 17 2022

2. Develop a logical data model based on the following requirements: (11/17/22)
a. Derive relations from the conceptual model.

Staff(staffNo, staffName, address, telNo, DOB, position, salary, clinicNo) ***Primary Key:*** staffNo ***Foreign Key:*** clinicNo **references** Clinic(clinicNo)
Clinic(clinicNo, clinicName, address, telNo) ***Primary Key:*** clinicNo ***Alternate Key:*** telNo, address
Pet(petNo, petName, DOB, species, breed, color, ownerNo, clinicNo) ***Primary Key:*** petNo ***Foreign Key:*** ownerNo **references** PetOwner(ownerNo), clinicNo **references** Clinic(clinicNo)
PetOwner(ownerNo, ownerName, address, telNo) ***Primary Key:*** ownerNo
Examination(examNo, complaint, description, dateSeen, actions, petNo, staffNo) ***Primary Key:*** staffNo ***Foreign Key:*** petNo **references** Pet(petNo), staffNo **references** Staff(staffNo)

b. Validate the logical model using normalization to 3NF.

Functional Dependencies

- Staff:
  - staffNo → staffName, address, telNo, DOB, position, salary, clinicNo (Primary Key)
- Clinic
  - clinicNo → clinicName, address, telNo (Primary Key)
- Pet
  - petNo → petName, DOB, species, breed, color, ownerNo, clinicNo (Primary Key)
- PetOwner
  - ownerNo → ownerName, address, telNo (Primary Key)
- Examination
  - examNo → complaint, description, dateSeen, actions, petNo, staffNo (Primary Key)

There are no partial or transitive dependencies present in the relations, therefore the model is already in 3NF for (no further normalization needed).

c. Validate the logical model against user transactions.

- List all the pets belonging to every owner
    - You would join the Pet and PetOwner tables with the the condition Pet.ownerNo = PetOwner.ownerNo
- List all the examinations performed on a given pet (eg. owner with id P01)
    - You would check the Examination.petNo = Pet.petNo using petNo as a foreign key and then print all examinations which met that condition (aka had petNo = P01).
- List all the Staff members working at a certain clinic eg clinic with clinicNo C05
    - You would use the foreign key clinicNo to join the Clinic and Staff table and then check and print all records with clincNo = 'C05'
- List all Staff in vet tech position
    - You would go to the Staff table and display/ select all the records with condition position = 'vet tech'
- List the amount of Staff members working at each clinic
    - You would join the staff and clinic relations using foreign key clinicNo, and then count using SUM the amount of staffNo's connected to each clinic, which would give you the total staff members working at each clinic

d. Define integrity constraints:
i. Primary key constraints.

- Staff - staffNo : Primary Key, Not Null
- Clinic - clinicNo : Primary Key, Not Null
- Pet - petNo: Primary Key, Not Null
- PetOwner - ownerNo : Primary Key, Not Null
- Examination - examNo : Primary Key, not Null

ii. Referential integrity/Foreign key constraints.

- Staff
    - clinicNo **references** Clinic(clinicNo) ON UPDATE CASCADE ON DELETE SET NULL
- Pet
    - ownerNo **references** PetOwner(ownerNo) ON UPDATE CASCADE ON DELETE NO ACTION
    - clinicNo **references** Clinic(clinicNo) ON UPDATE CASCADE ON DELETE NO ACTION
- Examination
    - petNo **references** Pet(petNo) ON UPDATE CASCADE ON DELETE SET NULL
    - staffNo **references** Staff(staffNo) ON UPDATE CASCADE ON DELETE SET NULL

iii. Alternate key constraints (if any).

- Clinic
    - telNo

    - address

iv. Required data.

- Staff - staffNo, staffName, clinicNo
- Clinic - clinicNo, clinicName, telNo
- Pet - petNo, ownerNo, clinicNo
- PetOwner - ownerNo, ownerName
- Examination - examNo, complaint, description, dateSeen, petNo, staffNo

v. Attribute domain constraints.

- Staff
    - staffNo - PK
    - staffName - String
    - address - String
    - telNo - String
    - DOB - Date
    - position - String
    - salary - Float
    - clinicNo - FK
- Clinic
    - clinicNo - PK
    - clinicName - String
    - address - String
    - telNo - String
- Pet
    - petNo - PK
    - petName - String
    - DOB - Date
    - species - String
    - breed - String
    - color - String
    - ownerNo - FK
    - clinicNo - FK
- PetOwner
    - ownerNo - PK
    - ownerName - String
    - address - String
    - telNo - String
- Examination
    - examNo - PK
    - complaint - String
    - description - String
    - dateSeen - Date
    - actions - String
    - petNo - FK
    - staffNo - FK

vi. General constraints (if any).

- Examination - dateSeen must be before or on currentDate
- Pet - DOB must be before or on current date
- Staff - DOB must be before or on the current date, but must not be more than 100 years ago

e. Generate the E-R diagram for the logical level (contains FKs as attributes).